Adapting to climate change: Why bother?

by John Morton

After an unusually cold winter on the Kenai with a long period of -30° F weather over the holidays, it's sometimes hard to believe that global climate change is real.

But, outside of the high arctic, the Kenai Peninsula may have the best documented impacts of climate change in Alaska. Over the last 50 years, the Harding Icefield has receded 5% in surface area and 21 meters (70 feet) in elevation while treeline in the Kenai Mountains has risen 50 meters (165 feet). Closed-basin lakes in the Kenai Lowlands have been drying, and shrubs and black spruce have encroached into peatlands that haven't changed in 8,000 years. Warmer summers have sustained a spruce bark beetle outbreak that killed over a million acres of white, Lutz, and Sitka spruce on the Peninsula. And wildfires are burning earlier (in April!) in bluejoint grass that has replaced trees in beetle-killed spruce forests. Fires are burning in unusual forest types like mountain hemlock, and they are ignited by more lightning strikes than in the past (1,000 strikes caused 22 fires in 2005!).

What about our fish and wildlife? Northern sawwhet owls and western screech owls have clearly shifted their ranges northward along the Alaska coastline in the last two decades. Northwest crows and Steller's jays are much more common on the western side of the Peninsula than they were in the recent past. The timing of bird migration is changing—new records of early arrivals or late departures for over 20 bird species were documented on the Kenai in 2008.

The loss of about 200 caribou (20% of the Peninsula-wide population!) to three avalanches in recent years may be due to changing snow conditions in the Kenai Mountains. A 40% loss in the average weight of sockeye salmon fry in Skilak Lake has been attributed to declining plankton abundance due to increased glacial meltwater with high silt loads. On the other hand, American marten appear to be increasing in the Kenai Lowlands, in part, due to warmer winters with more snow.

So for better or worse, many plants and animals are adjusting to accelerated climate change. Does this mean that life will go on, but just a little bit differently? Not really, if predictions by some biologists become true. First of all, some species are likely to go extinct. One study suggests that 13-37% of species worldwide will be on a trajectory for extinction by 2050. Polar bears likely fall into that category. Another study that examined the distributions of nearly 3,000 animal species in the Western Hemisphere suggests that some areas, such as arctic tundra, are likely to have 90% of the species in any given 50 x 50 km cell (an area about the size of Game Management Unit 15A) be different by the end of this century. In other words, faunal distributions in the future will bear little resemblance to those of today.

Perhaps one of the biggest changes will be the formation of novel species assemblages or communities. Each species responds to a changing climate differently due to its physiology, life-history, and ability to disperse and colonize new areas. Insects, for example, respond immediately to subtle changes in climate because their metabolism is dependent on air temperatures. However, the vegetation they rely on for food or egg laying may be unavailable because soil nutrients or a seed source may be preventing these plants from getting established. Dr. Glenn Juday at the University of Alaska Fairbanks has pointed out, for example, that climate has already changed so much that treeline in Alaska mountains should already be much higher than it currently is except that high-elevation soil often isn't available for germination.

This disconnect between what a species needs and its response to climate change can lead to a bad situation. Ecologists use terms like "trophic mismatch" to described situations where existing predator-prey and parasite-host relationships break down. When this occurs, species may be locally extirpated and, if the mismatch occurs across its entire range, it may lead to extinction.

Within professional wildlife management circles, we've begun to talk about helping species adapt to climate change. We can be reactive, in which case we try to maintain historic conditions by reducing the impacts of a rapidly changing climate. Or we can be anticipatory in our responses, in which case we try to help a species adapt to new conditions in a new climate. On the Kenai, for example, as our wetlands and

closed-basin lakes disappear in response to a warmer and drier climate, we could offset that loss to breeding waterfowl by creating managed impoundments or eliminating beaver harvest so that more ponds are created. These would be reactive responses.

Alternatively, the Kenai is moving towards more hardwood-dominated forests, and grassy savannahs in logged areas. We expect more frequent and rapidly spreading wildfires because conditions are drier. Furthermore, more continuous forest cover is being created as trees and shrubs spread into drying wetlands that once served as natural firebreaks. Perhaps, in anticipation of future habitats, we should deliberately manage towards those new habitats by not suppressing wildfires, and by using prescribed burns along the urban interface to reduce fuel loads and protect houses. These would be anticipatory responses.

In reality, we will likely use both approaches in the coming decades to respond to climate change. Accelerated climate change is not occurring uniformly across Alaska. It will be important for us to identify "refugia", areas in Alaska that are not expected to change much in coming decades. These areas will need to be conserved to ensure that existing species assemblages have a place to live and can serve as a Noah's ark to help populate areas that are rapidly undergoing change elsewhere in Alaska. Areas that are expected to be extremely dynamic in their response to climate change should be encouraged to change, sometimes through active habitat management and sometimes by employing assisted migration, a new approach to help species move across the changing landscape by translocating them and/or ensuring movement corridors.

There is an alternative to the actions proposed above. That's to do nothing. The natural world around us will change, whether we help it or not. However, if we choose the latter, it could be a world with sadly diminished beauty and less variety than we know today.

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